MAY
1970

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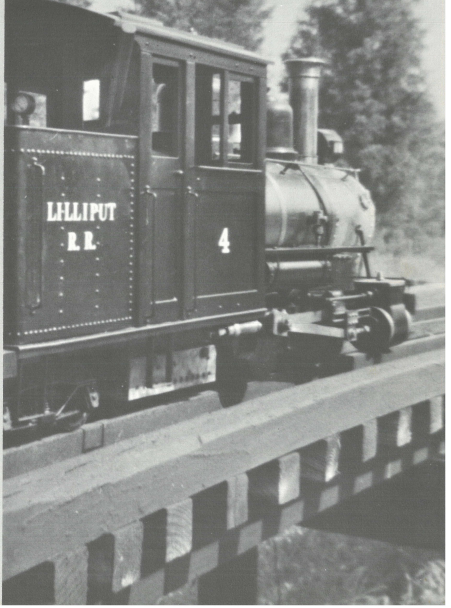
Live Steam

THE MONTHLY MAGAZINE FOR ALL LIVE STEAMERS AND LARGE-SCALE MODEL RAILROADERS



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COVER PHOTO

The caption might read, "Rumbling across the Sandy River Bridge in 1919" — but the picture was actually taken on the Cinder Sniffers' track in Cincinnati in 1969! Jim Aull's Maine Two-Footer makes reminiscing easy. Photo by James Aull.

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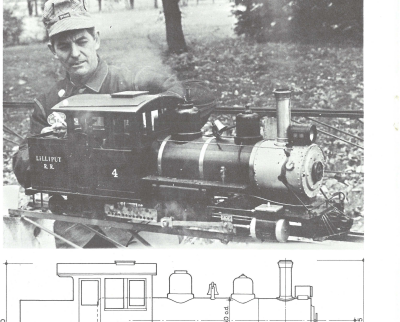
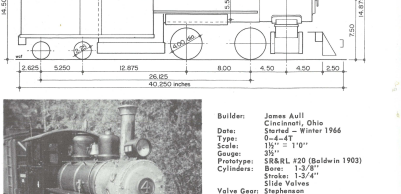
Jim Aull builds a Maine Two-Footer with

An Eye For

HUE BRAKKE





JAMES AULL

Builder:	James Aull Cincinnati, Ohio
Date:	Started — Winter 1966
Type:	0-4-4T
Scale:	1½" = 1'0"
Gauge:	3½"
Prototype:	SR&RL #20 (Baldwin 1903)
Cylinders:	Bore: 1-3/8" Stroke: 1-3/4" Slide Valves
Valve Gear:	Stephenson
Firebox:	Length: 5" Width: 3½" Grate Area: 17.5 sq. in. Fuel: Coal
Boiler:	Material: ¼" steel Pressure: 800 psi Tubes: 5/8" o.d. copper
Weight in working order:	142#
Indicated Horse Power:	0.4055
Tractive Effort:	6.3910

Beauty and Creative Hands

by Robert W. Maynard

The Live Steam Hobby has grown many fold in the past few years with new participants from all walks of life. This is good, and I'm glad for all who enjoy it. In the beginning the only people who associated themselves with the building and operation of engines were those who could actually make them. The availability of various types of locomotives from different companies (some of which might almost be assembled with a screwdriver) is a wonderful thing for those who, for good reason, do not have the time or the talent to build it from raw materials. The drawbacks, though, are the cost and the appearance of a lot of "look-alikes" on the tracks. Perhaps this is why I find Jim Aull's Two-Foot Gauge engine so refreshing for here is the creation of a thing of beauty without any superelaborate machine shop equipment. The only tools were a lathe, a drill press, brazing torch and the necessary hand tools. One item of note is that all milling was done on a lathe milling attachment. (I've been doing that for years too, and it *can* be done that way!)

Many people say, "I don't care for outside frame engines." Well, neither did I until I saw my first such engine in full size and then it seemed most interesting to watch those counterweights flop up, down, 'round and 'round. The designers of small narrow gauge engines used any and every available means to get the tractive force they needed from a locomotive. The loading gauge for the two-foot size is much smaller than standard but by the use of an outside frame they were able to achieve a better firebox size which allowed a larger boiler. This, of course, could supply larger cylinders and the engine was capable of more work for less money. This is really why it was built – to work for money and not (as most of us think) to provide a prototype for us Live Steamers to copy!

The love affairs we have with the Steam Locomotive gives everyone a chance to create something in the way he desires. Some of us are not endowed with the ability to visualize in all dimensions the good proportions that make an engine a thing of mechanical perfection. We are lucky if we are able to follow a tried-and-true set of prints and get the finished article to perform in somewhat realistic fashion. But there are some who are able to simply take a look at a photograph and turn this into a small locomotive that is pleasing in appearance and a willing performer on the track.

In some ways I'm sorry that the popularity of larger scales in the past few years has kept production of engines in the "Model I" class in low numbers. One-and-a-half scale engines are not exactly miniature engines and, although I can admire the work that goes into the manufacture of such a large engine, they are (at least for my part) not really models.

There is a way to capture the feeling of a large engine, yet it doesn't become so big that it is a problem to transport and handle. The two-foot narrow gauge, built to 1½" scale and adapted to 3½" gauge track, is one way to answer this problem. It is possible to make an engine "large" – I mean to make a *small* engine "large" – and at the same time provide the desirable portability feature worth saving.

The combination of these two separate items – the narrow gauge and the ability of a man to simply look at a photograph and make a beautiful working locomotive – have been combined in Jim Aull and his Maine Two-Footer. The engine described here was built by simply looking at a photograph; actually no prints were used in its manufacture. There were sketches but these were few. No castings to speak of; yet with a wonderful eye for proportional beauty and a pair of creative hands, this little gem came into reality in the time of two and a half years!

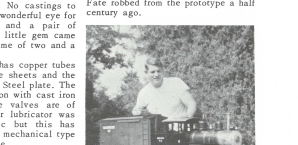
The steel boiler has copper tubes expanded in the tube sheets and the firebox is 3/16 H.R. Steel plate. The cylinders are cast iron with cast iron rings and the slide valves are of bronze. The cylinder lubricator was originally hydrostatic but this has been changed to the mechanical type for better performance.

The closeness of the cab to the tank make on-the-run firing somewhat difficult and coal does get scattered over the deck. Poking and stirring up the fire is usually done blind but in actual operation practice seems to smooth out the rough edges.

As with humans, Fate plays strange games with locomotives. When the Baldwin Locomotive Works turned out its 23,245th locomotive in May of 1903, no one expected that it would do any more than its assigned work as engine #7 on the two-foot gauge Eustis Railroad in Maine. When it was renumbered 20 on the Sandy River & Rangeley Lakes Railroad it was merely another step in history and few noticed the change. For only half of its existance the little engine charged to and fro on the narrow tracks in Maine . . . the remainder being spent in a decaying granite roundhouse across the Sandy River from Phillips, Maine. Damage suffered in a derailment back around 1920 was never repaired and scrap dealers made their way through the weeds and brush to clear out the roundhouse in 1935.

Even when Linwood Moody included a picture of the SR&RL #20 in his book, *The Maine Two-Footer*, and described how, "I used to wade through the thorns and puckerbrush from one deserted stall to another, trying to talk to those dead old engines of days gone by", the #20 was simply one of a host of lovable little engines for which so many of us developed an affection.

But it took artisan Jim Aull to resurrect the #20. In his shop in Cincinnati, he converted the two-dimension appeal of a photograph into a three-dimensional reconstruction, complete with the sounds, the smells, the warmth and the personality that Fate robbed from the prototype a half century ago.



Jim Aull with his SR&RL #20 put new life into memories of the dozens of these little engines that scooted around Maine for sixty years on the narrowest of all narrow-gauge tracks.

Proficiency Examinations for Operators of Small Steam Locomotives

by G. B. Kubicek

How much does the average small steam locomotive engineer know about the locomotive he has built, owns or drives? In many cases the lack of knowledge is surprising. SAFE *operation requires a certain minimal amount of knowledge and with this thought in mind, the Los Angeles Live Steamers have instigated a set of examinations intended to provide this knowledge.*

The large railroads provided 1st, 2nd and 3rd year exams of a very comprehensive nature for firemen and engineers, recognizing the need for study and education if he was to become more proficient in his job. Since we are talking about a hobby, we must approach the program on a voluntary basis. Many other hobbies have proficiency tests such as marksmanship badges, skating medals, glider proficiency tests and hobby contests in general. Although voluntary, we hope to develop enough prestige in the certification that the desire to own one will encourage individuals to study and earn one.

Not only do we hope to generate additional interest in Live Steam locomotives but recent experience indicates a need for instilling greater confidence in public officials, insurance officials and the public – especially where the public is carried as passengers. An accident caused by ignorance or reckless operation could do irreparable damage to the hobby throughout the world.

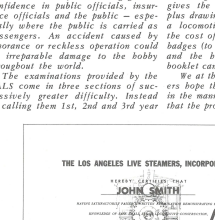
The examinations provided by the LALS come in three sections of successively greater difficulty. Instead of calling them 1st, 2nd and 3rd year examinations, they are called "Switching Engineer's License", "Freight Engineer's License", and "Passenger Engineer's License". The tests are taken under supervision without availability of answers (closed book) and will be kept on file for record. 80% is passing.

Answers to many of the questions are not easily available. In some cases the answers are contained in books long out of print or have never been published. For this reason, booklets will be provided which contain answers to all of the questions, similar to large railroad practice. Safety in operation is stressed.

Since small steam locomotive operation is a hobby, the LALS will provide (at near cost) the booklets, certificates and badges to any Live Steamer in the world if supervised testing can be arranged. No *certificates or badges will be given on an honorary or gratuitous basis – they must be earned.*

The test questions are printed here to familiarize Live Steamers with the scope of the program. The cost of each course is $5.00, with $2.00 of that as the charge for each study book which gives the answer to each question, plus drawings identifying each part of a typical valve. The remainder covers the cost of printed certificates, metal badges (to wear on your cap or jacket) and the handling costs. The study booklet can be purchased separately.

We at the Los Angeles Live Steamers hope these tests will be received in the manner intended – remembering that the program is voluntary.



Switching Engineer's Examination

1. What is a steam locomotive?
2. What is the single most important rule of small locomotive operation?
3. Why is this rule important?
4. What should the small locomotive engineer do to insure adherence to this rule?
5. What is the first concern of an engineer on a passenger carrying train?
6. What should passengers be told before leaving the loading platform?
7. What should the engineer of a passenger carrying train know about the track?
8. What should the engineer of a passenger carrying train know about sidings?
9. Who has jurisdiction over track traffic?
10. What does a red flag indicate?
11. What does a yellow flag indicate?
12. What does a green flag indicate?
13. What train crew, in addition to the engineer, should a passenger carrying train have?
14. What should the engineer of a passenger carrying train know about train brakes?
15. How is the locomotive whistle used for signaling?
16. Why is the whistle important?
17. Using "O" for short and "–" for long, give the engineers signals for the following:
    a) For stop at once when running (safely)?
    b) For alarm for persons on track?
    c) For approaching stations, junctions, or crossings?
    d) For approaching public crossings?
    e) For flagman or conductor to protect rear of train?
    f) For standing – back up?
    g) For calling attention to train crews?
    h) For proceed or start if standing?
    i) For call for signals?
    j) For indicating parting of train?
18. What should be the separation distance between passenger carrying trains?
19. What is a safe speed for passenger carrying trains?
20. What are the principal parts of a steam locomotive?

21. How does a steam locomotive produce work?
22. What limits the amount of work a steam locomotive can produce?
23. How does a locomotive produce power?
24. Can a steam locomotive produce more power than it can use?
25. What is tractive power?
26. On what is tractive power dependent?
27. Is all the available tractive power of a locomotive used in normal working?
28. What may cause drive wheels to slip?
29. What is friction?
30. On what does the amount of friction depend?
31. What is meant by the factor of adhesion?
32. Why is the study of friction important in the construction and operation of small steam locomotives?
33. What is meant by the coefficient of friction?
34. How does pressure between moving parts affect lubrication?
35. What is the main difference between prototype and small steam locomotives?
36. What is meant by 3/4 inch scale, one inch scale, and one and one half inch scale?
37. What are the accepted track gauges for these scales, respectively?
38. Are these track gauges scaled properly?
39. How are areas (such as grate area) scaled?
40. How are volumes (such as cylinder volume) scaled?
41. How do such volumes affect small locomotive weight? Is this important?
42. What is equalization?
43. Why is equalization important?
44. What allows a locomotive to balance properly on the track while running?
45. What is Whyte's Classification?
46. How does Whyte's Classification affect locomotive operation?
47. What is the locomotive leading or engine truck and why is it used?
48. What is a locomotive trailing truck and why is it used?
49. Is there any similarity of action between leading and trailing trucks?
50. What is a centering device?
51. What is a saddle on a locomotive?
52. What is a cradle on a locomotive?
53. If brakes are used, why should they be equalized?
54. Name the principal parts of the steam engine on a steam locomotive?
55. What is a cross head (and guides) and why are they used?
56. What is quartering?
57. Why is quartering necessary?
58. What are rods?
59. Why are rods necessary?
60. How are rods counter balanced? Why?
61. What effect does quartering have on balancing rods?
62. What is packing? A packing gland?
63. What are journals?
64. What are journal bearings or brasses?
65. What are journal boxes?
66. Name two principal types of bearings?
67. What is tram?
68. Why is tram important?
69. Why are wheel gauge and wheel tire dimensions important?
70. What is the locomotive running gear and why should it operate freely?
71. What is valve gear?
72. Name three types of valve gear?
73. What is the best valve gear for small steam locomotives?
74. How is valve gear controlled?
75. What is a throttle? Why is a throttle necessary?
76. Name three popular types of throttle used in small steam locomotives?
77. Name the principal parts of a locomotive boiler?
78. What is a steam dome?
79. What is a turret? (Fountainhead)
80. What is a water glass or gauge and what must be known about it?
81. What is a steam gauge?
82. What are try cocks?
83. What is a dry pipe?
84. What is a smoke box? Why is it necessary?
85. What is a blast pipe or exhaust nozzle?
86. What is a blower and why is it used?
87. What is the most effective heating part of the boiler?
88. What is a waterleg and why is it used?
89. What are stays or staybolts and why are they necessary?
90. How does steam get from the boiler to the cylinders?
91. What is the normally encountered steam pressure in small steam locomotives?
92. What is a safety valve and why is it necessary?
93. What is a reversing lever and how is it used?
94. What are cylinder cocks and why are they necessary?
95. Why is oil injected into the steam line to the cylinders of small steam locomotives?
96. Why is the rear section of the locomotive boiler mounted on flexible joints or slides?
97. What are boiler feedwater devices and why are they necessary?
98. What should the small locomotive engineer do if the locomotive feedwater devices fail? Why?
99. What is lagging and why is it useful?
100. Why should small locomotive engineers know all these details about small steam locomotives?

Freight Engineer's Examination

101. Why is safety so important in small locomotive operation?
102. How can the small locomotive engineer provide safe operation?
103. What should the engineer ask about a small steam locomotive he has not run before?
104. If carrying passengers, what should the engineer request when operating a strange locomotive?
105. What is important about coupling?
106. Name two types of couplers used with small steam (and diesel) locomotives?
107. Why should a safety chain be used between locomotive and tender?
108. What is a chafing plate?
109. Why must tender and car trucks be flexible?
110. Why is wheel gauge important?
111. Why is flange depth important?
112. Why is back to back wheel dimension important?
113. Why is flange thickness important?
114. Why should axles on any one car or tender truck be parallel?
115. Why should truck journal bearings be self-aligning?
116. What is a journal?
117. What is a journal bearing?
118. Why does it take more effort to start a train than it does to keep it rolling?
119. What is tractive effort? Why is it important?
120. What principal things affect tractive effort?
121. How can tractive effort be increased? Is there a limit?
122. How is tractive effort decreased?
123. How does friction affect tractive effort?
124. How does driver diameter affect tractive effort?
125. How does piston diameter affect tractive effort?
126. What does "steam" mean?

127. How is steam produced?
128. What two factors are generally used to describe steam?
129. What is saturated steam?
130. What happens to saturated steam when the pressure or temperature decreases?
131. How does the decrease in steam pressure or temperature affect locomotive operation?
132. What does "working steam expansively" mean?
133. Is expanding steam useful in small locomotive operation?
134. Why should locomotive cylinders be lagged? Steam pipes?
135. What is superheated steam?
136. Is it more useful than saturated steam in small locomotives? Why?
137. How is superheated steam produced?
138. What is the boiling point of water in an open pan?
139. What is the boiling point of water in a boiler when the pressure is 100 pounds per square inch? (PSI)
140. When a boiler is ruptured, why does it explode?
141. What safety devices are installed on a boiler to indicate or relieve dangerous operating conditions?
142. Why are try cocks installed on boiler backheads?
143. Why is a loop or "U" placed in the steam line between boiler and pressure gauge?
144. Why are blowoff cocks used on water level gauges?
145. What should the engineer know about the water level gauge?
146. What are surge tubes or water columns?
147. Why are water columns sometimes used with water level gauges?
148. What is boiler feedwater?
149. Why is boiler feedwater necessary?
150. How should boiler feedwater be added in a boiler under pressure?
151. How does purity of water affect boiler operation?
152. What is "treated water"? Why is it used?
153. Does water expand when heated? How does this affect locomotive operation?
154. What is a "crown" sheet? Why must it always be covered with water?
155. What are boiler water legs? Why are they important?
156. What is "priming"?
157. What is "foaming"?
158. What is the difference between priming and foaming and what can be done to cure either?
159. Does water circulate inside a boiler?
160. Why is boiler feedwater normally injected at the front of the boiler?
161. Is there any advantage in preheating boiler feedwater? Why?
162. What is a "mud" ring?
163. Why are boiler blowoff valves installed just above the mud ring?
164. Describe the major differences between oil fired and coal fired locomotive fireboxes?
165. What is forced draft and why is it necessary?
166. How is forced draft provided when the locomotive is standing still?
167. How is forced draft provided when the locomotive is running?
168. Should a blower be used when running? Why?
169. Why should a smokebox be airtight except for smoke stack, flue tubes, and blast orifice?
170. What is the range of temperatures to be expected in the smokebox?
171. What range of temperatures may be expected in the firebox?
172. Why should cold air be prevented from entering the forward part of the firebox?
173. What is a firebox arch? Syphons? Are they useful?
174. Why is valve gear necessary?
175. What is a radial valve gear?
176. What two main characteristics are normally provided by locomotive valve gear?
177. What is "dead center"?
178. What is a slide valve?
179. What kind of steam admission is normally associated with it?
180. What is a piston valve?
181. What kind of steam admission is normally associated with it? Why is this type of admission helpful?
182. What is "lead"? Why is it used?
183. What is valve "lap"? Why is it used?
184. How are lap and lead normally provided on radial valve gears?
185. What are the principal parts of Stephensons Valve Gear?
186. What are the principal parts of Walschaerts Valve Gear?
187. What are the principal parts of Baker Valve Gear?
188. What is meant by "direct gear" and why is it used?
189. How is a valve gear controlled?
190. What is meant by "notching up"?
191. What is the purpose of notching up?
192. What is meant by square valves?
193. How are square valves accomplished?
194. What is meant by a "blow"?
195. How is a locomotive timed?
196. Are different timing procedures used for different valve gears and, if so, why?
197. What is "valve drawing" and how does it affect locomotive operation?
198. How does wire drawing relate to valve gear?
199. Where can wire drawing take place in a small steam locomotive?
200. Do you consider this type of test worthwhile?

Passenger Engineer's Examination

201. What is a B.T.U.?
202. How do BTU's affect small locomotive operation?
203. Approximately how many BTU's are required to evaporate one pound of water at 100 psi?
204. How many BTU's (roughly) in a pound of coal? A pint of fuel oil? A pint of kerosene? A pound of butane?
205. How are BTU's transferred from fuel to water in a boiler – describe the whole process?
206. How many pounds of air are required to release the heat energy in a pound of coal? A pint of fuel oil?
207. How is air drawn into the fire-box?
208. How many ways is heat energy transferred to the water in a boiler?
209. What affects the rate of heat transfer?
210. How can the rate of heat transfer be improved?
211. How much heat is normally absorbed by the boiler firebox?
212. How much heat is absorbed by the flue tubes?
213. Which part of the flue tube absorbs the most heat energy?
214. How does a firebox arch affect combustion?
215. How does a combustion chamber affect combustion?
216. What is a combustion chamber?
217. What is a firebox arch?
218. What is heat conduction?
219. What is the coefficient of heat conduction?
220. How does the coefficient of conduction for copper compare with the coefficient for steel?
221. How does this affect boiler operation?
222. Where does heat conduction take place?
223. What is the approximate coefficient of conduction for asbestos or felt? Where is it used on a small locomotive and why?
224. What is the burning process? Describe in detail?

225. What happens if insufficient air is mixed with coal or fuel oil during burning?
226. What affect does a hole in a coal fire have?
227. Does the burning process continue in the flue tubes?
228. How is fuel (coal or oil) wasted?
229. Can waste be detected? How?
230. Why is firebox temperature important?
231. What affect does air over the fire have?
232. What is the difference in air flow in the firebox for different positions of the reverse lever?
233. How much water can be evaporated by one pound of coal approximately? By one pint of fuel oil?
234. Why do flue tubes generally start to leak at the firebox end first?
235. What is the fuel ignition temperature? How hot is it approximately in degrees?
236. What is the aptoximate temperature in a firebox with relatively efficient combustion?
237. Why is water in fuel oil detrimental to good combustion efficiency?
238. What is the affect of small exhaust nozzles on combustion and engine efficiency?
239. How should a coal fire be cared for while an engine is operated?
240. How should an oil fire be handled while the engine is in motion?
241. How should the water level in a small locomotive boiler be maintained and why?
242. Why aren't the answers in 239, 240, 241 usually accomplished during small locomotive operation?
243. How does the depth of coal in the firebox affect heat production?
244. Why can a charcoal fire be mntained at a greater depth than a coal fire?
245. When should coal or charcoal be added to the fire during engine operation? Why?
246. When should water be added to the boiler during engine operation? Why?
247. Why does an oil fire require more attention than a coal fire if it is to be efficiently used? Is this usually done, and, if not, why not?
248. Why should a well designed small boiler produce more steam (comparatively) with respect to small locomotive operation than the prototype with respect to large engine operation?
249. Does the small locomotive use a smaller or larger comparative amount of air with respect to the prototype? Why?
250. Where should the bottom of the water glass be located with respect to the boiler crown sheet?
251. Why is a gauge glass a more accurate device for reading water level than try cocks?
252. Which part of the boiler can be most easily harmed during engine operation and why? Why is this ham dangerous and how is it prevented?
253. How should steel boilers be treated after blowdown?
254. What is cylinder clearance? Why is it necessary?
255. How does it affect engine operation?
256. What is cylinder back pressure and how is it caused?
257. How does cylinder back pressure affect engine performance? How can it be reduced?
258. What is cylinder compression? How does it affect engine performance?
259. Is lead important in small locomotive operation?
260. How is lead provided?
261. Is lap important in small locomotive operation?
262. How is lap provided?
263. Do Walschaert and Baker Valve Gears provide valve lap and lead movement?
264. What is "dead center"?
265. What is the approximate valve position when the piston is on "dead center"?
266. What does the valve do if the reverse lever is moved from full forward to full back while the corresponding piston is on dead center?
267. Does the other valve do the same thing? why?
268. What does "square valves" mean?
269. How are valves made square?
270. Why should main crank pins (for Walschaert and Baker Valve Gear) be keyed or pinned in the driver?
271. What are eccentric cranks?
272. Why are they generally keyed to the crank pin?
273. What is the main purpose of the eccentric crank?
274. What is "cutoff"?
275. How is it controlled?
276. How does steam lap affect cutoff?
277. Why is lap useful in small locomotive operation?
278. What is "Mean Effective Pressure"?
279. How is Mean Effective Pressure determined? (MEP)
280. How does MEP affect drawbar pull?
281. How does throttle setting affect MEP?
282. How does cutoff affect MEP?
283. How does boiler pressure affect MEP?
284. Why is MEP more important than boiler pressure in small locomotive operation?
285. How do MEP and piston area affect frame construction and why?
286. How does quartering affect frame bracing?
287. How do scale factors affect piston rod and bolt diameters in small steam locomotives?
288. How do scale factors affect side and main rod size and wheel and rod bearing sizes in small steam locomotives?
289. What scale affects must be considered in designing tender and car truck bearings? Why are ball, roller, or needle bearings generally suggested?
290. Why should the running gear of a small steam locomotive be loosely fitted?
291. What affect does a loose fit of valve gear parts have on small steam locomotive operation?
292. Does looseness in the running gear of a small steam locomotive affect valve gear operation?
293. Does spring rigging of a small steam locomotive affect valve gear operation?
294. Why do some designers of small steam locomotives reduce piston diameter below that dictated by the scale factor? Why shouldn't this be done?
295. Are piston rings for steam use different from those used in internal combustion engines and, if so, why?
296. How should the running gear of small steam locomotives be lubricated?
297. How should the cylinders and valves of small steam locomotives be lubricated?
298. Why should a double oil lubricator or two oil lubricators be used for the cylinders of a small steam locomotive?
299. What is the difference between displacement and pump type lubricators and which is preferable? Why?
300. Do you think these questions (and the answers) are helpful to the operators of small steam locomotives?

NOTE: Details of the design of various valve gears have not been included in these tests because such information is more properly placed in theoretical studies rather than construction and operation. Many books are available for such studies for those who are interested.

A FINGER-PLATE WORK HOLDER for the apprentice

by Jack D. McKenty, M.D.

A drill press vise has drawbacks when it comes to holding small round or odd-shaped workpieces, but holding them by hand isn't the answer either. For accuracy, convenience, and safety, a "finger-plate work holder" is often ideal.

They are not available commercially, but they are easy to make at home, and the construction of one uses all the manual skills we have been discussing so far.

The holder consists of a baseplate with a notch in one side and several clearance holes of various diameters tastefully scattered around on it. Work is clamped to the base by means of a pressure plate with one or two fingers on the end of it. A real refinement would be a V-bottomed groove across the baseplate about 3/4" in from one side for holding round work, but to cut this with hand tools would be hard labor indeed.

Dimensions as given are not critical. Make it any size you like, but remember if you make it too small it gets hard to hold, and if you make it too large there will be an awful lot of heavy cutting and filing.

Stock can be obtained by browsing around a junk yard with your little 6" pocket rule at the ready. For the base you want a bit of mild steel 3½ x 3½", and from 3/8 to ½" thick. Chances are you will find a chunk of bar the right thickness, but about 4" wide, and several feet long. Buy it and take it home. It's cheap!

Take off the scale from both sides of one end of it with a coarse file, or a wire brush. The surfaces do not have to be unblemished; the chances are that rust will have eaten pits in the metal. These don't matter too much. File and draw file an edge on that end flat, square and smooth to use as a datum line.

Paint one side with layout dye, and mark out the shape of the baseplate with your combination square, scriber, and odd-leg calipers. The datum line forms one side of the finished baseplate. Don't bother yet laying out the notch or holes.

Cut it out using an 18-tooth blade in the hacksaw, cutting outside the scribed lines, but as close to them as you can. It actually doesn't matter if the sides are crooked and irregular, but for practice, be as accurate as possible. Finish by filing to the lines.

Complete the layout work by scribing diagonals from the corners, and make a prick punch mark at the intersection. With dividers, scribe a circle 1" radius with this mark as the center. Lay out the various holes on this circle. For the bottom of the notch, make a punch mark and scribe a 1/8" radius circle around it. Scribe the lines for the notch so they touch the sides of the circle. Dimensions are not critical.

Center punch all the places for the holes, and drill them to the sizes shown, including a 1/4" hole at the base of the notch. The hole in the very center of the work is drilled 13/64" or #7 and a 1/4-20 tap started in it before taking the work out of the drill press. Finish tapping the hole with the work piece in the vise.

Cut out and file the notch, and finish by putting a slight chamfer on all edges and a tiny countersink in each hole, including the ones on the bottom.

The bolt in the center is a 1½" length of 1/4-20 thread rod, available in 3' lengths at most hardware stores, or cut a length from a long 1/4" bolt. If it is too snug to screw in with your fingers, thread two nuts onto it and tighten them against each other. Screw the rod into the baseplate with a wrench on the top nut. (If you ever have to *remove* a tight stud, put on two nuts, and use the wrench on the bottom one.)

Lock it in place by making two or three punch marks underneath; each of them half in the baseplate and half in the rod.

The finger pieces are cut from a piece of mild steel bar approximately 3/4" wide by 1/4" thick. Something approaching this size can be gotten at the junkyard. The two-finger can be cut to shape, but it is easier to do a bit of forging, especially if you find some bar exactly the right cross section.

Lay it out as shown in the diagram "2-finger Stage 1." Cut the slot by having two 18-tooth blades in the hacksaw simultaneously. Grip it in the vise by the edges of the unslotted end, and heat up the base of the slot red hot with a propane torch.

Quick, before it cools, put the end of a piece of steel rod in the slot so that it bears against one of the fingers, and hammer the other end of the rod until the finger bends out about 45°. Hear it up again and hammer the other finger out the same way, in the opposite direction. If the fingers are out of line, hold the piece with old pliers or tongs, and heat it up a third time. Put it down on a piece of flat metal, such as the baseplate, and hammer it flat. Try not to dent it too much.

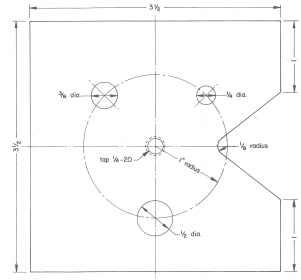
Layout and cut out the other pressure plate. Finish filing both pieces to shape as shown, with nicely rounded corners and chamfered edges. Lay out the clamp screw holes and drill and tap 1/4-20. The slot on each for the center stud is laid out and each end is drilled 17/64". Chip away the bridge of metal between the holes with a small cape or diamond-nose chisel (Sears) and a hammer, and finish with a file. The 1/4" center stud should be a nice, easy fit.

This small amount of metal cutting with a chisel is kind of fun, but you can see why I don't suggest chipping a V-bottomed groove in the baseplate that way.

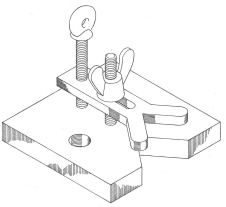
The clamp screw is a 2" round head 1/4-20 bolt with a washer soldered in the screwdriver slot. Use acid-core solder and your propane torch with the smallest burner. Do not try it with a soldering iron. It needs more heat than most soldering irons provide. Do not melt the solder onto the work with the torch. Heat up the work until it is hot enough to melt the solder by itself, without the torch.

The clamp screw should be an easy fit in the holes in the finger pieces. If it is tight, run a 1/4-20 adjustable die down it, after tightening the die.

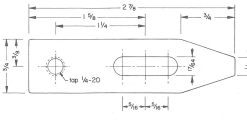
The center stud is fitted with a standard washer and wing nut, available at any hardware store.



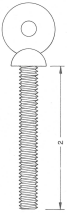
Base Plate
1 required - mild steel - 3/8" or 1/2" thick



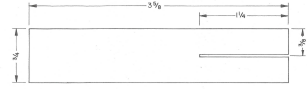
Assembled Work Holder



One-Finger Pressure Plate
1 required - mild steel - 1/4" thick

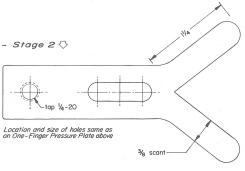


Clamping Bolt



Two-Finger Pressure Plate
1 required - mild steel - 1/4" thick

⇧ Stage 1 - Stage 2 ⇩

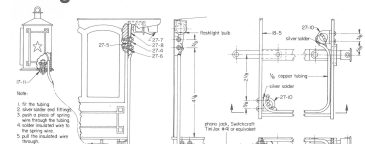


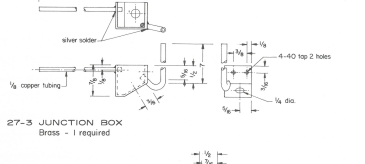
Location and size of holes same as on One-Finger Pressure Plate above

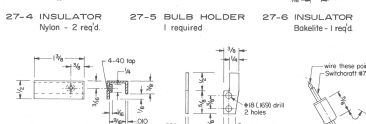
A FINGER-PLATE WORK HOLDER for the apprentice

scale: full size

wiring







building the RARITAN

by William H. Morewood

ASSEMBLY NOTES

The Boiler Jackets 26–1 (which will be covered in the next installment) permit the use of insulation around the boiler barrel. Asbestos or fiberglass cloth are suitable. Wrap the material around the barrel, hold it in place with light wire and then install the jackets.

If you paint the jackets any color other than black, wrap one strip of fiberglass cloth around the ring on the rear of the smokebox and then clamp the jacket on top of the fiberglass. This will prevent the high temperature of the smokebox from discoloring the paint on the jacket.

In the smokebox, steel screws will rust rapidly. Use brass or bronze in this location.

The Blower Nozzle should be bent so that the jet from the nozzle fills the inside diameter of the stack.

Small 200 PSI, 1¼" diameter flanged face pressure gauges may be obtained from Cole's Power Models, Ventura, California. These look fine and work well.

Put pump packing in the throttle gland and pull the nut up tight so that the valve stem is held quite tightly. This will overcome the tendency of the steam to open the valve.

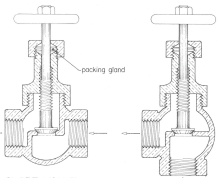
Locomotives of the 80's were brightly painted and a variety of colors were used. The cowcatcher, wheels, cylinder head covers, side of the headlight, cab and tender might be painted bright red. The brass trim should be polished. The enamel sold in hardware stores is suitable.

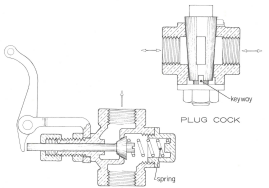
VALVES

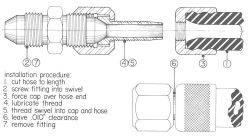
Globe valves are standard for Live Steam installations rather than gate valves since they may be obtained in commercial sizes, straight thread model sizes, and taper thread model sizes. Commercial globe valves are usually made with separate discs (valve heads) unlike model valves which are made like needle valves; discs integral with the stems. Seats are usually 45° angle except where a delicately controlled flow is required. For example: needle valves and whistle valves.

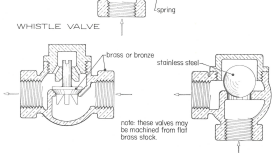
When purchasing commercial plug cocks, it would be wise to state the type of service the cock will be for: water, gasoline, air, etc. In this way the cock may be supplied with the pertinent lubricant.

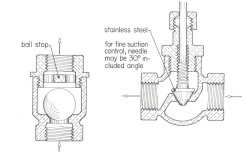
Check valves may be commercially purchased in all forms; however, valves for model use are generally confined to horizontal and angle ballcheck. Here and there a disc valve with wing guides and/or stem will appear. These are usually made by some dedicated model valve or pump maker.






installation procedure:
1. cut hose to length
2. screw fitting into swivel
3. force cap over hose end
4. lubricate thread
5. thread swivel into cap and hose
6. leave .010" clearance
7. remove fitting
REUSEABLE HOSE COUPLING


brass or bronze
stainless steel
note: these valves may be machined from flat brass stock
HORIZONTAL CHECK
ANGLE BALL CHECK


ball stop
stainless steel
for fine suction control, needle may be 30° included angle
VERTICAL BALL CHECK
GLOBE NEEDLE VALVE

Cinder Sniffers' New Year Run

by Robert W. Maynard

The 7th Annual January 1st run of the Cincinnati Cinder Sniffers came off in spite an "almost" blizzard which provided the area with a six-inch snow fall for the first White Christmas Season since 1960. Although the thermometer dipped to 16° at 7:00 a.m. on New Year's morning, the sun popped in and out a couple of times and we decided "to have a go at it."

A plow with blocks added to clear between the rails was pulled through light drifts on previously shoveled rails, and ice which had accumulated on some of the rail was cleared with shovels.

Russ Conley's C.B.J. & Southern 4-6-0 suffered water pump trouble and had to be withdrawn after 1½ hours of steaming. "Evelyn", a 4-6-2 of the E.G.B. & Pacific, was under steam for over three hours and covered almost six miles in that time.

Cold weather operation presents some problems – mostly the freezing of small water lines until steam is raised. There is, no doubt, greater consumption of coal but in the excitement of action this isn't usually noticed. Valve oil turns to a thick "glue" and it is wise to have the lubricator filled before venturing out into the wintry air. Water storage can be a problem but hot water in plastic containers stored in the auto trunk prevents freezing.

A light 3/4" scale locomotive does present difficulty on wet and frozen rail heads, and the effective plowing of snow with even a large 3½" gauge engine is almost impossible and it becomes necessary to manually plow the rails before running. Winter operation can be fun although it is more work . . . but then it is a shame to place a locomotive on the shelf in the Fall and not move it until Spring!

ROBERT MAYNARD

GREG KORNER

Scheduled Meets

May

15 PIONEER VALLEY LIVE STEAMERS
17 Braxton W. Barnfather, Secry.
3 Fleetwood Drive
Sandy Hook, Conn. 06482

24 NORTHERN ILLINOIS LIVE STEAMERS
David M. Boyd's track
Secretary
315 Ridge Avenue
Clarendon Hills, Ill. 60514
Rain Date – May 31st

29 BLS NATIONAL MEET
30 Los Angeles Live Steamers
31 Ralph R. Greer
3½" – 4½" – 7½" gauges
Joel Carkin, Secretary
12732 Kittridge Street
North Hollywood, CA 91606

29 PENNSYLVANIA LIVE STEAMERS
30 3½" – 4½" – 7½"
31 William H. Scott, Secretary
R. D. 1, Box 400
Sellersville, Pa. 18960

June

5 NEW JERSEY LIVE STEAMERS
6 Advance registration required
7 3½" – 4½" – 7½"
Ralph R. Greer, Secretary
845 Kilsyth Road
Elizabeth, N. J. 07208
Phone 201 – 353-4424

6 IOWA MODEL STEAM
7 ENGINEERS
3½" – 4½" – 7½" gauges
Pershing G. Scott
R.F.D. 1
Marion, Iowa 52302

13 GOLDEN GATE LIVE STEAMERS
14 2½" – 3½" – 4½" – 7½"
Joe Bryan, Secretary
1225 Scott Street
ElCerrito, California 94530

July

11 ONTARIO SUNPARLOR LINES
12 3½" – 4½"
Jack Hart, Secretary
1381 Shepherd Street
Windsor, Ontario, Canada

August

1 SOUTHERN MINNESOTA LIVE STEAMERS
Al O'Neil's Track
3½" – 4½" – 12"
Lake City, Minnesota

2 PALATINE, LAKE ZURICH & WAUCONDA RAILROAD
Paul Mooney Meet
4½" gauge
Frank Saville
512 Milton
Barrington, Ill. 60010
Phone 312 – 381-3070

September

5 PENNSYLVANIA LIVE STEAMERS
6 2½" – 3½" – 4½"
7 William H. Scott, Secretary
R. D. 1, Box 400
Sellersville, Pa. 18960

12 IOWA MODEL STEAM
13 ENGINEERS
3½" – 4½" – 7½"
Pershing G. Scott
R.F.D. 1
Marion, Iowa 52302

12 GOLDEN GATE LIVE STEAMERS
13 2½" – 3½" – 4½" – 7½"
Joe Bryan, Secretary
1225 Scott Street
ElCerrito, California 94530

18 NEW JERSEY LIVE STEAMERS
19 Advance registration required
20 3½" – 4½" – 7½"
Ralph R. Greer, Secretary
845 Kilsyth Road
Elizabeth, N. J. 07208
Phone 201 – 353-4424

26 ONTARIO SUNPARLOR LINES
27 3½" – 4½"
Jack Hart, Secretary
1381 Shepherd Street
Windsor, Ontario, Canada

October

2 SOUTHERN MINNESOTA LIVE STEAMERS
Al O'Neil's Track
3½" – 4½" – 12"
Lake City, Minnesota

9 PIONEER VALLEY LIVE
10 STEAMERS
3½" – 4½" – 7½"
Braxton W. Barnfather, Secretary
3 Fleetwood Drive
Sandy Hook, Conn. 06482

Regular Run Days

GOLDEN GATE LIVE STEAMERS
Every Sunday weather permitting
2½" – 3½" – 4½" – 7½"
Joe Bryan, Secretary
1225 Scott Street
ElCerrito, California 94530

JAWIL VALLEY RAILROAD
3rd Sunday each month
7½" gauge
Harry P. Haas
Route 1, Box 47A
Jamul, California 92035

LOS ANGELES LIVE STEAMERS
1st Sunday each month
3½" – 4½" – 7½"
Joel Carkin, Secretary
12732 Kittridge Street
North Hollywood, Calif. 91606

MONTREAL LIVE STEAMERS
1st Sunday of each month
3½" – 4½" – 7½" gauges
L. H. Dalloway, Secretary
33 Brentwood Road
Beaconsfield, Quebec, Canada

NEW JERSEY LIVE STEAMERS
Every Sunday May through October
3½" – 4½" – 7½"
Ralph R. Greer, Secretary
845 Kilsyth Road
Elizabeth, N. J. 07208
Phone 201 – 353-4424

PENNSYLVANIA LIVE STEAMERS
Apr. 19, May 3, June 14, July 12 &
26, Aug. 9, Sept. 20, Oct. 4 & 18
William H. Scott, Secretary
R. D. 1, Box 400
Sellersville, Pa. 18960

PIONEER VALLEY LIVE STEAMERS
2nd Sunday each month
3½" – 4½" – 7½"
Braxton W. Barnfather, Secretary
3 Fleetwood Drive
Sandy Hook, Conn. 06482

RAILROADERS CLUB OF SAN ANTONIO
3rd Sunday each month,
weather permitting
7½" gauge
Ceo Beck
2626 McCullough Avenue
San Antonio, Texas 78212

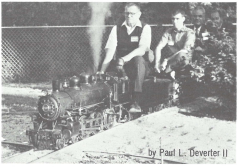
RIVERSIDE LIVE STEAMERS
4th Saturday each month
Hunter Park- Iowa & Columbia Ave.
Riverside, California
Francis H. Smith, Secretary
5536 Dewey Avenue
Riverside, California 92504
Phone 688-9533 or 683-9628

SOUTHERN CALIFORNIA LIVE STEAMERS
3rd Sunday each month
3½" – 4½" – 7½"
K. O. Keever, Secretary
2764 Maple
Rialto, California 92376

WABASH, FRISCO & PACIFIC
Every Sunday
12" gauge
Grand and First Streets
0.4 miles south of Post Office
Glencoe, Missouri

WAUSHAKUM LIVE STEAMERS
2nd Sunday each month
April through November
Lake Waushakum, Framingham, Mass.
3½" completed
4½" under construction
George Hilliard, President
357 Bishop Street
Framingham, Mass. 01701

Houston Live Steamers Visit Dallas



by Paul L. Deverter II

On November 1st the Gulf Coast Chapter – NRHS made an overnight trip to Fort Worth using our newest acquisition, ex-Santa Fe sleeper "Verde Valley" behind the Santa Fe's "Texas Chief."

Upon arrival at Fort Worth, a hot box in a roller bearing journal heated the axle end to cherry red which caused considerable excitement when the risk is understood. The axle could have failed in another 5 or 10 miles which would surely have derailed our car at 70 MPH!

Harold Timm, one of quite an active group of Live Steamers in Dallas, arranged with Alan Guiberson to open his shop to us and run his 4–6–0. (The photo shows Harold running Alan's 4–6–0 with Harold's son, Don Schwartz and George Werner as passengers.) Alan's 7½" track circles his home where he also demonstrated a model triple expansion engine and displayed a full-size triple expansion engine acquired from a university in Georgia. About 15 Live Steamers were present and the opportunity to meet and visit were greatly appreciated.

Our track in Houston – the Crawdad Creek Railroad – now has 190' of 3½" track and 120' of 4¾" track. The club has purchased John Enders' diesel and members bought his Atlantic and 0–4–0 switcher – all 1" scale. We have lots of plans – but would welcome more workers. For information, contact Paul L. DeVerter II, 3427 Banbury Place, Houston, Texas 77027.

Companion Text
to American Locomotive Engineering

The long-awaited Companion Text to the previously published book, American Locomotive Engineering by G. Weissenborn has been received. Originally published in 1871, it furnishes steam locomotive design, engineering and drafting data for equipment of that period. It describes in detail the 96 exquisite drawings reproduced in the earlier volume in addition to a wealth of engineering material.

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NATIONAL BLS MEET

(If you plan to attend the BROTHERHOOD OF LIVE STEAMERS' Meet in Los Angeles on May 29, 30 and 31, please fill in this coupon or send the requested information to

JOEL CORBIN
12723 Kittridge Street
North Hollywood, California 91606

NAME

ADDRESS

CITY STATE ZIP

Number in party

Dates attending: May 29 ☐ 30 ☐ 31 ☐

Number and type of equipment that you will bring to meet:

Locomotives: Gauge: 7½" 4¾" 3½"

Traction: Stationary:

Other (please list):

Will you have a static display? Yes ☐ No ☐

Will your display require a table? Yes ☐ No ☐

Approximate dimensions and weight of display:

If you wish to reserve a camper or trailer space, please give the type and approximate dimensions of vehicle.

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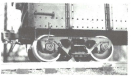

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NOTICE
Receipt of many new drawings makes old list obsolete. Watch for NEW ENLARGED CATALOG in these ads shortly.
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THOSE PM PACIFICS

I feel as though the articles on the P.M. Pacifics have taken too much space that could have been better devoted to our model steam hobby. A line drawing and a short article would have been sufficient.

BUD NOVY
724 SUFFOLK AVE.
WESTCHESTER, ILL. 60153

Though the Magazine is different and I am not interested in clubs, etc., I believe that with back history now and then it will come out on top. Keep up with the pictures!

D. G. DAGUE
P. O. BOX 379
TOPINABEE, MICH. 49791

The conversion figures supplied for 1" scale contain errors; possibly the most startling are the decimal equivalents for 3, 6 and 9" since these are simply ⅛, ¼ and ⅜". For example:
51" (4'3") should be 4.250 not 4.248
66" (5'6") should be 5.500 not 5.498
33" (2'9") should be 2.750 not 2.749

I enjoyed the articles. Anyone building almost any type of locomotive can pick up many important details from the very fine photos presented.

DEAN W. FENTON
4624 EAST 13TH PLACE
TULSA OKLAHOMA 74112

Articles like "The Pere Marquette's Pacifics" in LIVE STEAM should make interesting reading for any scale model railroader. Even though I model in HO scale, I am interested in all phases of railroading – past, present and future.

ROY R. FULLER
942 PENNOYER AVENUE
GRAND HAVEN, MICHIGAN 49417

With the scarcity of pages in LIVE STEAM, I am hopeful once the prototype history of the PM 4–6–2's is over that these pages may be devoted to items of specific relationship to the actual building of scale Live Steam locomotives.

K. R. CASFORD
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Trains and Railroad Magazines don't devote half of their magazine to model live steam so let's keep LIVE STEAM a model magazine.

ALAN DIAMOND
9345 LEMON AVENUE
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I enjoy LIVE STEAM Magazine very much. I couldn't afford both Trains Magazine and LIVE STEAM so I prefer LIVE STEAM Magazine.

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Acquired from estate of late Lester D. Friend, nationally known pioneer Live Steamer, his complete estate "Beverly Hills Railroad R.R." 15" scale 7½" gauge locomotive "Tiger" 1856 4—4—0 and tender, 5 cars, 2 flat beds, 1 water tank, 1 box car, 1 caboose all beautifully detailed to museum quality in 1850 era. Complete RR 2700' dural track mounted on redwood ties, switches, crossovers, signs, electric signals, asking $22,500. Also 3/4" UP Big Boy 4—6—4 articulated 90% complete, 5' long and beautifully done, 14 wheel all brass "Centipede" tender 3' long, 5 coal cars, asking $35,000. Also 1" scale 4—4—2 and tender, requires piping to complete, asking $2,500.00. For details contact Eldred J. Rhodes, 67-A Ocean St., Lynn, Mass. 01902.

New Wabash Mogul $2800 asking price. Contact E. Allen, 1194 N. Patterson Ave., Goleta, Calif. 93017.

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Little Engines 1" 0—6—0 chassis $325.00. D. H. Rohrer, 1736 N. Pepper St., Burbank, Calif. 91505, phone 213 — 845-0846.

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